broadly tipped with bright purplish-black.——The third list of birds collected in Ecuador by M. Stolzmann contains twelve new species. L. Taczanowski and Count Berlepsch contribute the article (P. Z. S., 1885), and the latter appends some general considerations on the ornithology of Western Ecuador. This fauna now includes 468 species, besides eighty-five from Pichincha, Nanegal and Quito. Eastern Ecuador must be richer in birds, since Messrs. Sclater and Salvin state that Mr. Buckley collected nearly 800 species there. It also appears that there are but few species peculiar to Ecuador as a whole.——It appears from a note of Professor Owen, that the heart of the Apteryx has characters resembling those of Ornithorhynchus. This is especially the case with the auriculo-ventricular valve.

EMBRYOLOGY.[1]

THE DEVELOPMENT OF ANURIDA MARITIMA GUERIN.—During the latter part of the summer of 1883 I had good opportunities to study the development of this interesting insect at Wood's Holl, Mass., where I found its ova, together with the parent insects, in great numbers under stones along the beach just below high-water mark. This appears to be the same species as is mentioned by Dr. Packard in the U. S. Fish Commission report for 1871 and '72, p. 544. The observations which I have been able to make relate entirely to such changes in the egg as may be noted with reflected and transmitted light, as I did not prepare sections of the eggs at the time. The accompanying plate represents several stages of the development of this type, and I have also figured the adult so that it may be compared with the genera Achorutes, Lipura, Anura, etc., to which it is obviously very nearly allied.

The adults are bluish-gray, and measure about 2.25^{mm} in length; ocelli ten, five on each side; no spring or elater developed in the full-grown insect.

The eggs are quite opaque, or practically so when observed with transmitted light, and measure .36 of a millimeter in diameter. They are dirty yellow in color and not white as are the eggs of Isotoma described by Dr. Packard in his memoir[2] on the development of that genus.

When the young Anurida first leaves the egg it strongly resembles Achorutes in the form of its body, as may be gathered from Figs. 3 and 4, and like the adults of that genus is whitish in color. The bluish, velvety appearance of the integument or cuticula which characterizes the adult does not appear to be developed until some days after hatching, or until one or more ecdyses have been accomplished. The eggs of this species are

[1] Edited by JOHN A. RYDER, Smithsonian Institution, Washington, D. C.

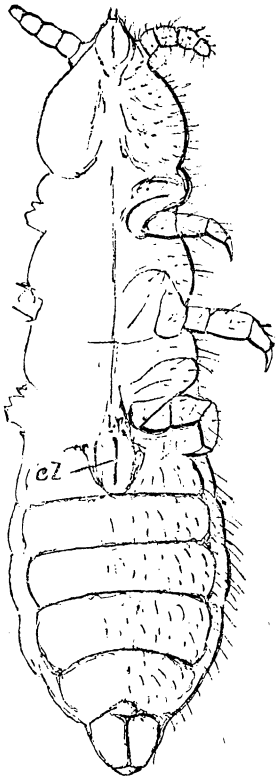
[2] Embryological studies on Diplax, Perithemis and the thysanurous genus Isotoma. Mem. Peabody Acad. Sciences, Vol. I, No. II, 1871, pp. 15–21, plate 3.

also over twice the diameter of those of Isotoma, which measure only about .15 of a millimeter in diameter, so that there is more yolk present and development is much more extremely meroblastic or decidedly epicyemate in character. This will be evident if Figs. 9, 10, 11 and 12 are compared with the earliest stages of Isotoma figured by Packard in the memoir just cited.

One feature in the development of Anurida which has interested me greatly is the presence of a very rudimentary spring or elater, *el*, shown from below in Fig. 4 and from the side in Fig. 3. This appendage, which probably represents a pair of degenerate limbs, is produced from the anterior, inferior part of the fourth abdominal segment, but on the ventral side of the adult no sign of its presence is visible, as may be gathered from an examination of Fig. 1. This organ in Anurida does not arise from the penultimate segment, as in Isotoma, as stated by Packard, but from the antepenultimate or fourth abdominal segment which is in reality the one from which the elater arises in such genera of Collembola, as Lepidocyrtus, Triæna, Tomocerus, etc. In the just-hatched larval Anurida, the elater is developed to exactly the same degree as in *Triæna mirabilis* Tullb., according to Brook.[1] The inference, therefore, is that the springless genera of Collembola are degenerated forms which have descended from others which were provided with well-developed elaters. In fact it is now possible to trace the gradual degeneration of the elater through the genera Achorutes, Xenylla, Triæna and the young of the species under consideration here. Linking this series with those having a more developed elater and tenaculum, and these again with such forms as Campodea and Machilis, we realize what a remarkable series of differential changes the abdominal appendages of the Thysanura and Collembola have undergone, starting probably from the still less modified Symphyla, in which there is no differentiation even between the appendages of the thorax and abdomen.

The earliest stages were not considered, as the ova were too opaque to be studied by transmitted light, and the earliest intimation of the formation of the germ is shown in Fig. 8 at *gb*, the germ-band being viewed in profile transversely or from one end. The germ-band or ventral plate forms a pronounced thickening which lies on one side of the vitellus, with its longest diameter coinciding with the longer diameter of the egg. This germinal band soon becomes widest anteriorly, as shown by the transverse profile views of it represented by Figs. 11 and 12. From these and a lateral profile view (Fig. 10) of the same stage, I have constructed the diagrammatic representation (Fig. 9) of the germ-band as it would be seen by reflected light, or as an opaque object, extending over very nearly a semicircumference of the

[1] Journ. Linn. Soc. London, XVII, 1882, pp. 21–22, pl. 7, figs. 11 and 12.



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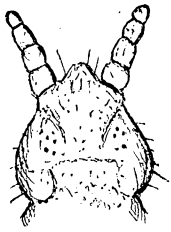

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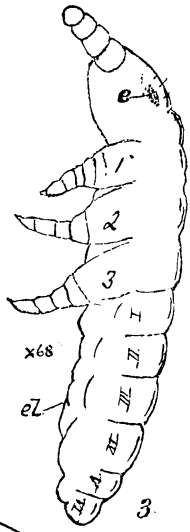

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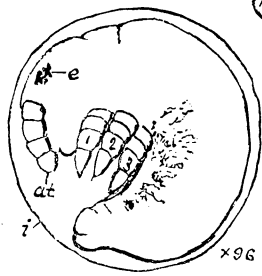

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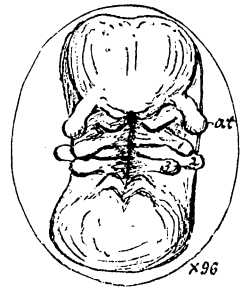

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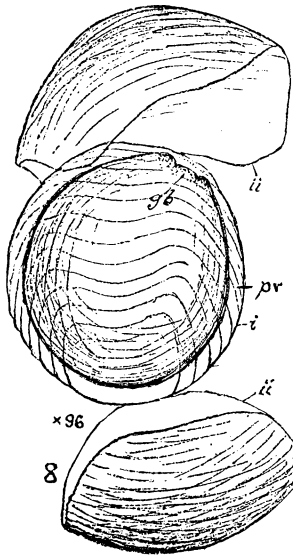

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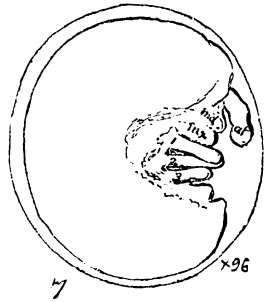

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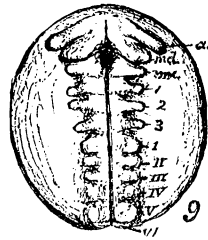

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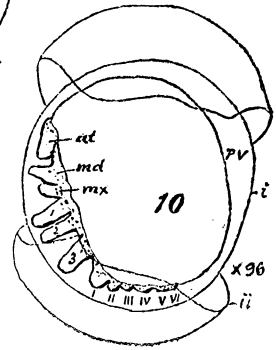

Development of Anurida.

vitellus. In the later profile (Fig. 10) the germ-band shows the appendages of the embryo developed as follows: the antennæ *at*, the mandibles *md*, the maxillæ *mx*, the three pairs of legs, *1*, *2* and *3*, the collophoral segment, I, and the following abdominal segments up to VI. In the next stage, when it may be said that the embryo is already beginning to lengthen, as shown in Fig. *7*, the ventral plate, with its appendages, is no longer convex when viewed laterally in profile, but becomes strongly concave or bent upon itself, and it then appears as if it had been shortened, the embryonic appendages being also much crowded together at their distal ends, as shown in Figs. 6 and 7, which represent the same stage viewed from in front and in profile. In the course of further development the embryo increases still more in length, as shown in Fig. 5, when it may be said that the definitive form of the parent animal begins to be obvious. By this time the limbs and antennæ have become definitely segmented. During the earlier stages the limbs, antennæ, collophore, etc., had the form of mere blunt, paired papillæ, or of blunt, clavate, tentacle-like paired outgrowths from the lateral surfaces of the ventral plate or elongated germinal area.

The changes which determine the appropriation of the yolk, or whether a dorsal organ is developed which takes part in this or not, as held by Korotneff in the case of Gryllotalpa, are points which have not been made out. This, as well as the manner in which the blastoderm is formed, can only be made out by means of sections.

The eggs, as well as the adult animals, are not readily wetted with water or even in dilute alcohol. I have succeeded in hardening them by treating them first with weak alcohol and afterwards placing them in dilute chromic acid or Müller's fluid.

The egg of this species, after the formation of the germinal plate, is invested by an inner covering, *i*, and an outer one, *ii* as shown in Figs. 8 and 10. By very careful manipulation under a compressor the outer one may be ruptured, when it will be discovered that the inner one is wrinkled in the most singularly symmetrical fashion, as represented in Fig. 8. Whether this second wrinkled covering is the serous envelope or amnion I am not certain. It may be that it is a cuticular chitinous secretion from the cells of the blastoderm, such as has been found by Kingsley[1] to invest the embryo of Limulus while yet in the egg. Inside the second egg-envelope, and between it and the ovum proper, there is a very considerable perivitelline space, *pr*, developed.

Imperfect as these notes are, I publish them, first, because the development of this form differs greatly in its external features from that of Isotoma, described by Packard; secondly, because the development of this type recapitulates very briefly the devel-

[1] Notes on the embryology of Limulus. Quart. Journ. Mic. Sci., Oct., 1885.

opment of the elater, so characteristic of the Collembola, indicating, as it seems to me, that that organ, in the genera in which it is absent or rudimentary, has been lost through degeneration; and thirdly, because the egg is more decidedly meroblastic or teleplasmic than that of Isotoma.—*John A. Ryder.*

PHYSIOLOGY.[1]

REPORT OF COMMITTEE ON DISINFECTANTS OF THE AMERICAN PUBLIC HEALTH ASSOCIATION.—A little more than a year ago the Public Health Association, stirred up by the prospective speedy advent of cholera in this country, took steps to arm both practitioners of medicine and the public at large against not only that disease but all ailments supposed to owe their existence to "germs." A committee was appointed consisting of Drs. Sternberg and Smart, of the Army, Raymond, of Brooklyn, Vaughan, of Ann Arbor, Leeds, of New Jersey, Watkins, of New Orleans, and Rohé, of Baltimore, to investigate the efficiency of the various obtainable germicides and antiseptics in respect to sanitation and preventive medicine. Probably no more competent and conscientious workers than are some, if not all of the members of this committee, could have been chosen to carry out this difficult undertaking. The report opens by clearing away a common confusion of terms. An *antiseptic* is a substance which simply prevents or arrests the development of bacterial organisms; a *disinfectant* or *germicide* is a substance which kills them. All disinfectants are antiseptics, but not all antiseptics are disinfectants. The work of the committee was limited to the study of the disinfecting properties of the substances investigated.

The report consists partly of the descriptions of original experiments, and partly of historical essays, embodying the results of the most trustworthy investigators in this field. The general reader would search in vain the mass of bacteria literature to find some definite idea of the comparative value of different disinfectants; but in the work before us the confusion is reduced to a minimum, because the many different substances investigated are considered from the same standpoint and after the same methods. It means very little when one experimenter declares that chromic acid, for example, is an antiseptic in the proportion 1 : 1000, and another that carbolic acid has the same power when of the strength 1 : 500; for the more concentrated the strength of the germ-food solution the greater must be the concentration of the antiseptic to be efficient, and a percentage of antiseptic, that would prevent the development of germs for the space of three days, might be lived down by bacteria in the course of six.

Mercuric chloride as a disinfectant easily stands at the head of substances readily obtainable. As this substance is a violent

[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.